ORDER NO. AVS9408895C8

Service Manual

CCTV Cameras

WV-BP310/WV-BP312/WV-BP314

(Lens : option)

SPECIFICATIONS

	WV-BP310/WV-BP314		WV-BP312
Pick-up Device:	753 (H) x 582 (V) pixels, Interline Transfer CCD		753 (H) x 582 (V) pixels, Interline Transfer CCD
Scanning Area:	4.8 (H) x 3.6 (V) mm (Equivalent to scanning area of 1/3" pick-up tube)		4.8 (H) x 3.6 (V) mm (Equivalent to scanning area of 1/3" pick-up tube)
Synchronization:	Internal, External, Line-locked or Multiplexed vertical drive (VD2) selectable		Internal, External or Multiplexed vertical drive (VD2) selectable
Scanning System:	2 : 1 interlace		2 : 1 interlace
Scanning:	625 lines / 50 fields / 25 frames		625 lines / 50 fields / 25 frames
Horizontal:	15.625 KHz		15.625 KHz
Vertical:	50 Hz		50 Hz
Horizontal Resolution:	570 lines		570 lines
Video Output:	1.0 Vp-p composite 75 ohms / BNC connector		1.0 Vp-p composite 75 ohms / BNC connector
Signal-to-Noise Ratio:	46 dB (AGC OFF)		46 dB (AGC OFF)
Electronic Light Control:	Equivalent to continuous variable shutter speed between 1/50 sec. and 1/10,000 sec.		Equivalent to continuous variable shutter speed between 1/50 sec. and 1/10,000 sec.
Minimum Illumination:	0.08 lux at F1.4, AGC ON		0.08 lux at F1.4, AGC ON
Gain Control:	Selectable AGC ON (+24 dB) or OFF		Selectable AGC ON (+24 dB) or OFF
Lens Mount:	C-mount or Special C-mount (CS-mount) selectable		C-mount or Special C-mount (CS-mount) selectable
Ambient Operating Temperature:	-30° C -+50° C (-22° F - 122° F)		-30° C -+50° C (-22° F - 122° F)
Ambient Operating Humidity:	Less than 90%		Less than 90%
Power Source:	WV-BP310/ABG: 220 - 240V AC 50 Hz WV-BP314E: 24V AC 50 Hz		12V DC, VP Multiplex or 12V DC Selectable
Power consumption:	WV-BP310/ABG: WV-BP314E:	4.6W 3.4W	0.22A
Dimensions (without lens):	67 (W) x 55 (H) x 123 (D) mm [2-5/8" (W) x 2-3/16" (H) x 4-13/16" (D)]		67 (W) x 55 (H) x 123 (D) mm [2-5/8" (W) x 2-3/16" (H) x 4-13/16" (D)]
Weights (without lens):	WV-BP310/ABG: WV-BP314E:	0.61kg (1.3 lbs) 0.46kg (1.0 lbs)	0.46kg (1.0 lbs)

Weights and dimensions indicated are approximate.
Specifications are subject to change without notice.

Panasonic

CAUTION
RISK OF ELECTRIC SHOCK
DO NOT OPEN
CAUTION:
TO REDUCE THE RISK OF ELECTRIC SHOCK, DO NOT REMOVE COVER (OR BACK). NO USER SERVICEABLE PARTS INSIDE.
REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.

This symbol warns the user that uninsulated voltage within the unit may have sufficient magnitude to cause electric shock. Therefore, it is dangerous to make any kind of contact with any inside part of this unit.

This symbol alerts the user that impotant literature concerning the operation and maintenance of this has been included. Therefore, it should be read carefully in order to avoid any problems.

IMPORTANT SAFETY NOTICE

There are special components used in this equipment which are important for safety. These parts are indicated by the "⚠" mark on the schematic diagram and the replacement parts list. It is essential that these critical parts should be replaced with manufacturer's specified parts to prevent shock, fire, or other hazards.
Do not modify the original design without permission of manufacture.

WV-BP310/WV-BP314

STANDARD ACCESSORIES

ALC Lens Connector (YFE4191J100).....1 pc.
Body Cap .....1 pc.

OPTIONAL ACCESSORIES

Lenses : WV-LA2.8, WV-LA6B2, WV-LA12B2, WV-LA18, WV-LA36, WV-LA4510, WV-LA608, WV-LA1208, WV-LA4R5C3A, WV-LA9C3A, WV-LA210C3, WV-LA408C3, WV-LA908C3, WV-LZ81/6, WV-LZ81/10, WV-LZ83/6, WV-LZ61/10, WV-LM4R5A, WV-LM6B2, WV-LM12B2, WV-LF6, WV-LF12, WV-LF4R5C3A, WV-LF9C3A

WV-BP312

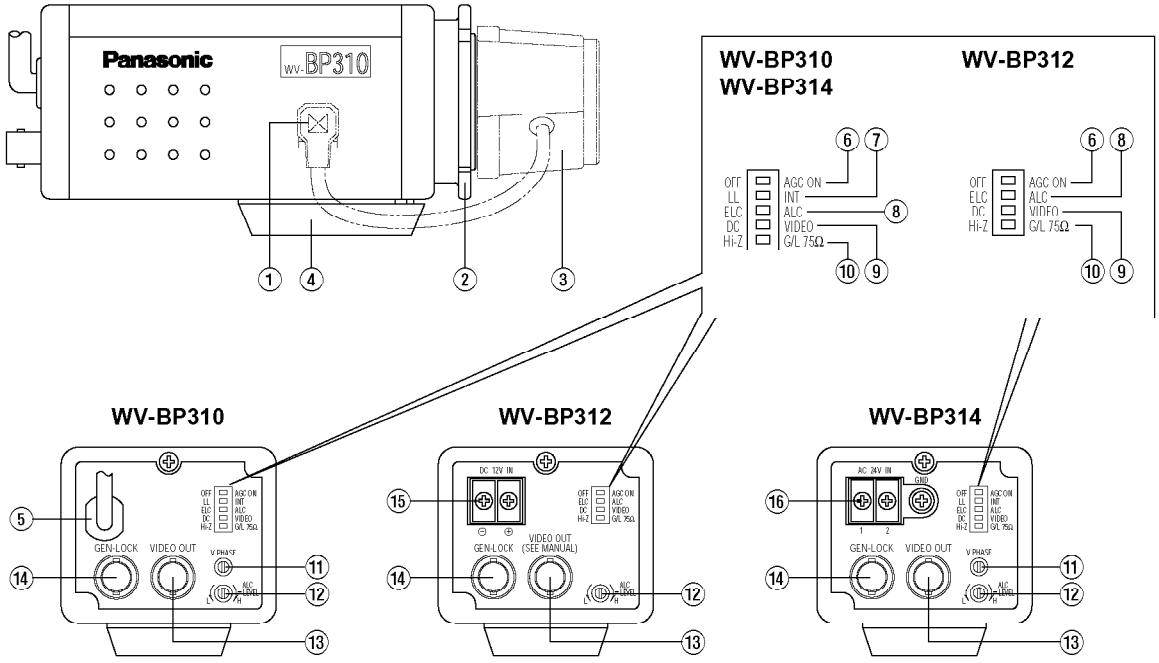
STANDARD ACCESSORIES

ALC Lens Connector (YFE4191J100) .....1 pc.
Body Cap .....1 pc.

OPTIONAL ACCESSORIES

Lenses : WV-LA2.8, WV-LA6B2, WV-LA12B2, WV-LA18, WV-LA36, WV-LA4510, WV-LA608, WV-LA1208, WV-LA4R5C3A, WV-LA9C3A, WV-LA210C3, WV-LA408C3, WV-LA908C3 WV-LZ81/6, WV-LZ81/10, WV-LZ83/6, WV-LZ61/10 WV-LF6, WV-LF12, WV-LF4R5C3A, WV-LF9C3A

MAJOR OPERATING CONTROLS AND THEIR FUNCTIONS



(1) Auto Iris Lens Connector

This 4-pin female connector supplies the power and either video signal or DC control signal to the auto iris lens.

A 4-pin male connector, which can be mated with the camera`s female connector, is supplied as a standard accessory (Part No. YFE4191J100).

This male connector can be installed on lenses which have incompatible type connector.

(2) Flange-back Adjusting Ring

This ring is used to adjust the back focal length or picture focus by rotating this ring to clockwise for C-mount lens or counterclockwise for special C-mount (CS-mount) lens.

(3) Lens (Option)

(4) Camera Mounting Screw Hole

This threaded hole(1/4"-20) is used to mount the camera onto a mounting bracket or tripod.

(5) Power Cord

(6) AGC On/Off Switch (AGC ON/OFF)

This switch is used to select the gain of the video amplifier as follows;

ON: When the lens iris is fully opened under a low light condition, a clear picture is obtained by automatic increase of the gain.

OFF: A natural and low-noise picture is obtained under a low light condition.

(7) Sync Selection Switch (INT/LL)

This switch is used to select the camera synchronization mode.

INT: When no signal is supplied to the Gen-lock Connector, the camera synchronization mode is set to internal 2 : 1 interlace.
Whenever the Gen-lock video signal is supplied to the Gen-lock Connector, the camera synchronization mode is automatically set to external synchronization.

LL: The camera synchronization mode is set to the Line-lock even if the Gen-lock video signal is supplied to the Gen-lock Connector.

Note: Set this switch to the INT position for Gen-lock operation.

(8) Electronic Light Control / Automatic Light Control Selection Switch (ELC/ALC)

This switch is used to select the lens as follows.

ALC: Choose this position when using an auto iris lens.

ELC: Choose this position when using a fixed or manual iris lens.

(9) Lens Selection Switch (VIDEO/DC)

This switch is used to select the supplied auto iris control signal to the lens from the Auto Iris Lens Connector(1).

DC: Choose this position when the auto iris control lens requiring DC control signal.

VIDEO: Choose this position when the auto iris control requiring video signal such as WV-LA8B, WV-LA16B, WV-LA25B, WV-LA50B, is mounted on the camera.

(10) Gen-lock Termination Switch (G/L 75 Ω / Hiz)

When looping through the Gen-lock video input signal, set this switch to the Hi-Z position and in all other cases, set this switch to the 75-ohm position.

(11) Vertical Phase Control (V.PHASE)

The vertical phase of the camera signal can be adjusted to match the vertical phase of the line power.

(12) Auto Iris Level Control (ALC LEVEL, L(Low)/ H(High))

This control adjusts the control level of the auto iris control when the Lens Selection Switch (9) is set to the DC position and the auto iris lens which requires the DC control voltage such as WV-LA12 etc., is mounted on the camera.

Note: When the Lens Selection Switch (9) is set to the VIDEO position, the auto iris control level should be adjusted by the lens.

(13) Video Output Connector (VIDEO OUT)

A 1.0 Vp-p/75 ohms composite video signal is provided at this connector.

Whenever the multiplexed vertical drive (VD2) signal is supplied to this connector, the camera synchronization mode is automatically set to Vertical Drive Lock.

(14) Gen-lock Video Input Connector (GEN-LOCK)

A composite B/W or colour 1.0 Vp-p/75 ohms video signal, or black burst 0.3 Vp-p/75 ohms or composite sync 4 Vp-p/75 ohms should be supplied to this connector for external synchronization.

(15) DC 12V In Terminal (DC 12V IN)

This terminal accepts 12V DC power source (10.5V - 16V).

Cautions:

1. Connect this to a 12V DC class 2 power supply only.
2. To prevent fire or shock hazard, the UL listed wire VW-1, style 1007 should be used for the cable for DC 12V Input Terminal.

(16) AC 24V In Terminal (AC 24V IN)

This terminal accepts 24V AC power source (19.5V-28V). Be sure to connect grounding lead to the GND terminal.

Cautions :

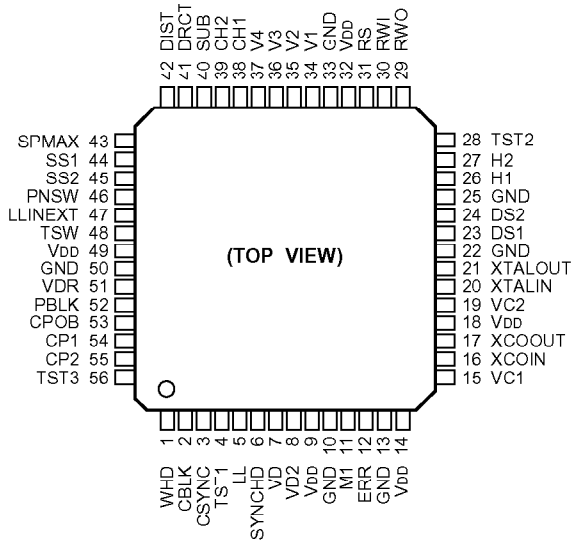
1. Connect this to a 24V AC class 2 power supply only.
2. To prevent fire or shock hazard, the UL listed wire VW-1, style 1007 should be used for the cable for AC 24V Input Terminal.

CIRCUIT DESCRIPTION

IC Description

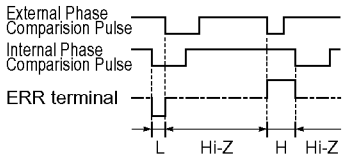
1. Main Board

1.1. IC2 on the Main Board is using the CCD Drive Pulse Generator Gate Array Logic IC YWBU6121KS.
Description of this IC is as follows:



Pin	Name	I/O	Description
1	WHD	O	Wide Horizontal Drive Pulse output terminal.
2	CBLK	O	Composite Video Blanking Pulse output terminal.
3	CSYNC	O	Composite Sync signal output terminal.
4	TST1	I	Test mode switching terminal 1.
5	LL	I	Line Lock Pulse (50Hz or 60Hz) input terminal.
6	SYNCHD	I	External Sync signal (CSYNC or HD) input terminal. When Sync signal supplied: VS mode. When HD signal supplied: HD/VD mode. If VD signal supplied: VD Sync mode. If VD signal not supplied: H-rate Sync and V-rate use Internal Sync signal.
7	VD	I	Vertical Drive Pulse input terminal.
8	VD2	I	Vertical Drive Pulse 2 input terminal.
9	VDD	–	Power supply terminal.

Priority	Sync	M1	Input Condition
1	VD2	H	Supplied VD2 Pulse.
2	LL	H	LLINEXT: H or Open Supplied Line Lock Pulse to LL terminal.
3	VS	L	Supplied CSYNC signal to SYNCHD.
4	HD/ VD	L	Supplied CSYNC signal to SYNCHD.
5	INT SYNC	L	Except above conditions.

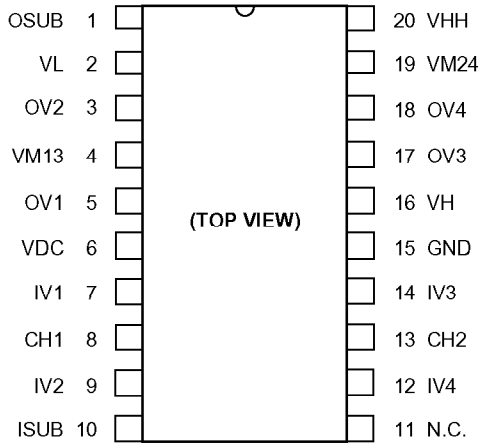
Pin	Name	I/O	Description
10	GND	–	Ground terminal.
11	M1	O	H/V Selection signal output terminal for external Low Pass Filter. H : V-rate PLL L : H-rate PLL
12	ERR	O	Error signal of Phase Comparator output terminal. 
13	GND	–	Ground terminal.
14	VDD	–	Power supply terminal.
15	VC1	O	VCO Control signal output terminal.
16	XCOIN	I	VCO input terminal.
17	XCOOUT	O	VCO output terminal.
18	VDD	–	Power supply terminal.
19	VC2	O	VCO control signal output terminal.
20	XTALIN	I	Crystal Oscillator input terminal.
21	XTALOUT	O	Crystal Oscillator output terminal.
22	GND	–	Ground terminal.
23	DS1	O	CDS Pulse 1 output terminal.
24	DS2	O	CDS Pulse 2 output terminal.
25	GND	–	Ground terminal.
26	H1	O	ØH Tranfer Pulse 1 output terminal.
27	H2	O	ØH Tranfer Pulse 2 output terminal.
28	TST2	I	Test mode switching terminal 2.
29	RWO	O	Reset Pulse Width adjust signal output terminal.
30	RWI	I	Reset Pulse Width adjust signal input terminal.
31	RS	O	Reset Pulse output terminal.
32	VDD	–	Power supply terminal.
33	GND	–	Ground terminal.
34	V1	O	ØV1 Transfer Pulse output terminal.
35	V2	O	ØV2 Transfer Pulse output terminal.
36	V3	O	ØV3 Transfer Pulse output terminal.
37	V4	O	ØV4 Transfer Pulse output terminal.

Pin	Name	I/O	Description
38	CH1	O	Charge Pulse output terminal for ØV1.
39	CH2	O	Charge Pulse output terminal for ØV3.
40	SUB	O	Electronic Shutter Pulse output terminal.
41	DRCT	I	Sensitivity Direction Setting signal input terminal 1 when Automatic Sensitivity Control mode.
42	DIST	I	Sensitivity Direction Setting signal input terminal 2 when Automatic Sensitivity Control mode.
43	SPMAX	I	Maximum Shutter Speed Setting signal input terminal when Automatic Sensitivity Control mode. H or Open: 1/10,000 sec L : 1/80,000 sec
44	SS1	I	Sensitivity Control Mode Switching signal input terminals.
45	SS2	I	

SS1	SS2	Sensitivity Control Mode
H or Open	L	Automatic Control Mode
H or Open	H or Open	Normal Mode 1/60 sec for EIA 1/50 sec for CCIR
L	H or Open	Fixed Shutter Mode 1/100 sec for EIA 1/60 sec for CCIR

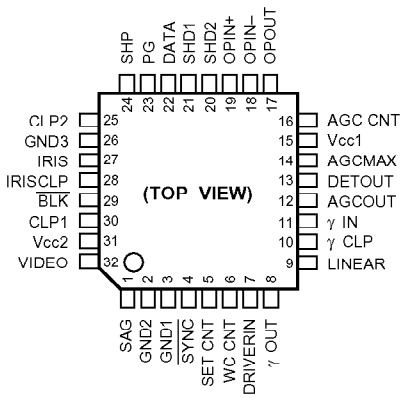
Pin	Name	I/O	Description
46	PNSW	I	TV System Switching signal input terminal. L or Open: EIA H : CCIR
47	LLINEXT	I	Line Lock Switching signal input terminal. H or Open: LL Enable L : LL Disable
48	TSW	I	Timing Switching signal input terminal. H or Open: S mode L : M mode
49	V_{DD}	–	Power supply terminal.
50	GND	–	Ground terminal.
51	VDR	O	Vertical Drive Pulse output terminal.
52	PBLK	O	Pre Blanking Pulse output terminal.
53	CPOB	O	OB (Optical Black) Clamp Pulse output terminal.
54	CP1	O	Clamp Pulse 1 output terminal.
55	CP2	O	Clamp Pulse 2 output terminal.
56	TST3	I	Test Mode Switching terminal 3.

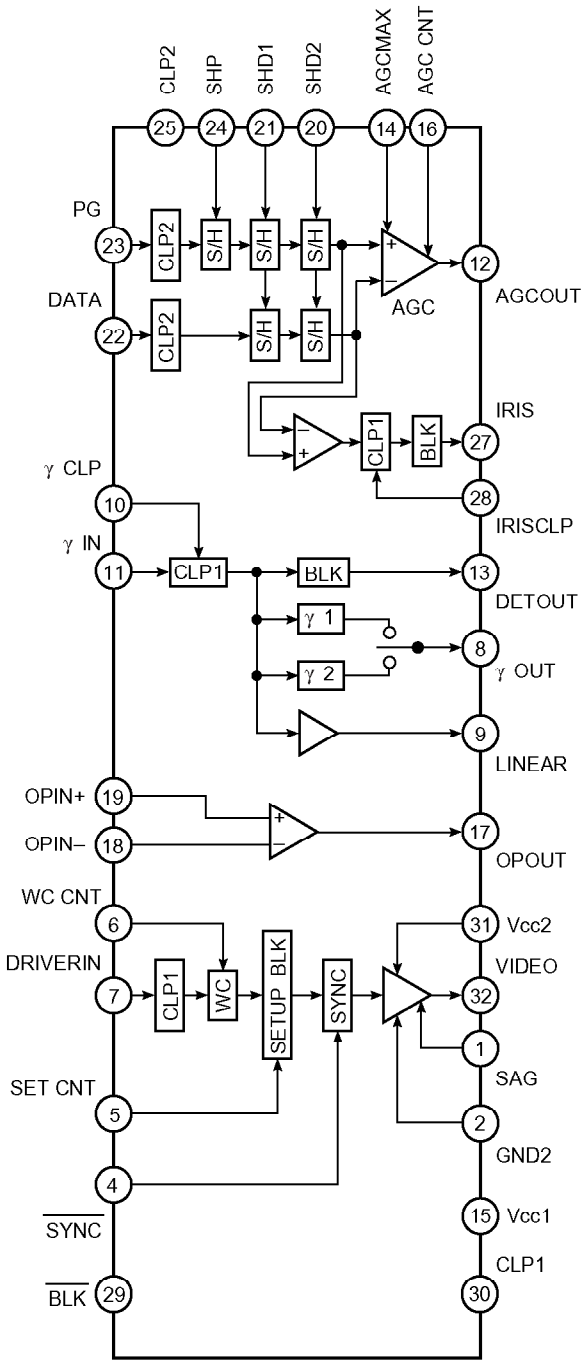
1.2. IC4 on the Main Board is using the Vertical Drive IC MN3112SA.
Description of this IC is as follows:



Pin	Name	I/O	Description
1	OSUB	O	V_{SUB} signal output terminal.
2	VL	–	VL voltage supply terminal.
3	OV2	O	Vertical Pulse 2 output terminal.
4	VM13	I	VM13 voltage supply terminal.
5	OV1	O	Vertical Pulse 1 output terminal.
6	VDC	–	Power supply.
7	IV1	I	Vertical Pulse 1 input terminal.
8	CH1	I	Horizontal Pulse 1 input terminal.
9	IV2	I	Vertical Pulse 2 input terminal.
10	ISUB	I	V_{SUB} signal input terminal.
11	N.C.	–	Non Connection.
12	IV4	I	Vertical Pulse 4 input terminal.
13	CH2	I	Horizontal Pulse 2 input terminal.
14	IV3	I	Vertical Pulse 3 input terminal.
15	GND	–	Ground terminal.
16	VH	–	VH voltage supply terminal.
17	OV3	O	Vertical Pulse 3 output terminal.
18	OV4	O	Vertical Pulse 4 output terminal.
19	VM24	–	VM24 voltage supply terminal.
20	VHH	–	VHH voltage supply terminal.

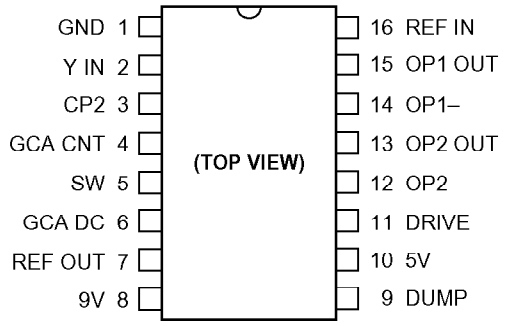
1.3. IC15 on the Main Board is using the CCD Black and White Camera One-chip Process IC YWCXA1310AQ. Description of this IC is as follows:





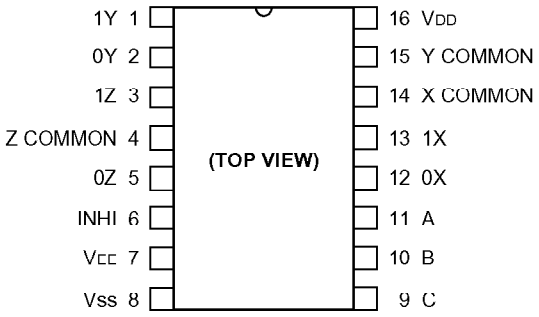
Pin	Name	I/O	Description
1	SAG	I	Sag Compensation signal input terminal.
2	GND2	–	Ground terminal.
3	GND1	–	Ground terminal.
4	$\overline{\text{SYNC}}$	I	Sync signal input terminal.
5	SET CNT	I	Setup Level control terminal.
6	WC CNT	I	White Clip Level control terminal.
7	DRIVERIN	I	Driver signal input terminal.
8	γ OUT	O	γ Correction signal output terminal.
9	LINEAR	O	Linear (γ - Off) signal output terminal.
10	γ CLP	I	γ Clamp Pulse input terminal.
11	γ IN	I	γ Correction signal input terminal.
12	AGCOUT	O	AGC signal output terminal.
13	DETOUT	O	AGC Detect signal output terminal.
14	AGCMAX	I	AGC Amp. Max Gain control terminal.
15	Vcc1	–	Power supply terminal.
16	AGC CNT	I	AGC Control signal input terminal.
17	OPOUT	O	Operational Amp. output terminal.
18	OPIN–	I	Operational Amp. – input terminal.
19	OPIN+	I	Operational Amp. + input terminal.
20	SHD2	I	Sample Hold Pulse input terminal.
21	SHD1	I	Sample Hold Pulse input terminal.
22	DATA	I	CCD signal input terminal.
23	PG	I	CCD signal input terminal.
24	SHP	I	Sample Hold Pulse input terminal.
25	CLP2	I	Clamp Pulse input terminal.
26	GND3	–	Ground terminal.
27	IRIS	O	Iris Control signal output terminal.
28	IRISCLP	I	Iris Clamp Pulse input terminal.
29	$\overline{\text{BLK}}$	I	Blanking Pulse input terminal.
30	CLP1	I	Clamp Pulse input terminal.
31	Vcc2	–	Power supply terminal.
32	VIDEO	O	Video signal output terminal.

1.4. IC3 on the Main Board is using the ALC Control IC YWC5023068E1.
Description of this IC is as follows:



Pin	Name	I/O	Description
1	GND	–	Ground terminal.
2	Y IN	I	Luminance signal input terminal.
3	CP2	I	Clamp Pulse input terminal.
4	GCA CNT	I	GCA Control signal input terminal.
5	SW	I	ALC Level Control signal input terminal.
6	GCA DC	I	GCA DC input terminal.
7	REF OUT	O	Reference signal output terminal.
8	9V	–	9V power supply terminal.
9	DUMP	O	Dumper signal output terminal.
10	5V	–	5V power supply terminal.
11	DRIVE	O	Drive signal output terminal.
12	OP2–	I	Operational Amp. 2 inverting input terminal.
13	OP2 OUT	O	Operational Amp. 2 output terminal.
14	OP1–	I	Operational Amp. 1 inverting input terminal.
15	OP1 OUT	O	Operational Amp. 1 output terminal.
16	REF IN	I	Reference signal input terminal.

1.5. IC1 on the Main Board is using the Triple 2-ch Analog Multiplexers/Demultiplexers IC YWMC14053BF.
Description of this IC is as follows:

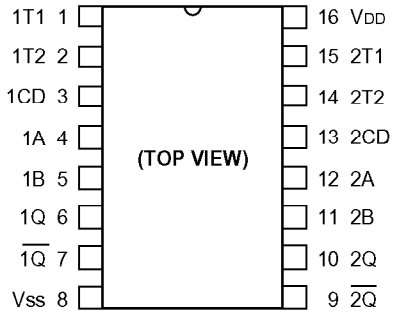


Truth Table

INHIBIT	C	B	A	X COMMON	Y COMMON	Z COMMON
L	L	L	L	0X	0Y	0Z
L	L	L	H	1X	0Y	0Z
L	L	H	L	0X	1Y	0Z
L	L	H	H	1X	1Y	0Z
L	H	L	L	0X	0Y	1Z
L	H	L	H	1X	0Y	1Z
L	H	H	L	0X	1Y	1Z
L	H	H	H	1X	1Y	1Z
H	*	*	*	NONE	NONE	NONE

* : Don't care.

1.6. IC5 on the Main Board is using the Dual Precision Retriggerable Monostable Multivibrators IC YWMC 14538BF.
Description of this IC is as follows:

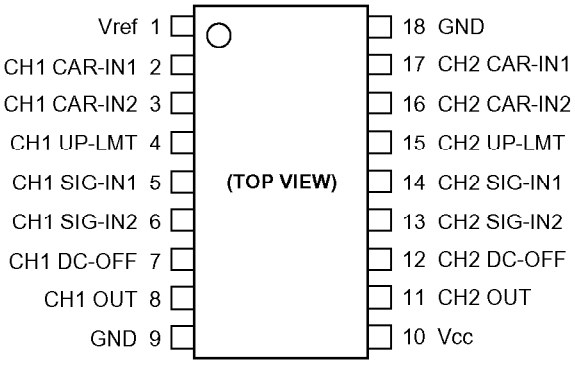


Truth Table

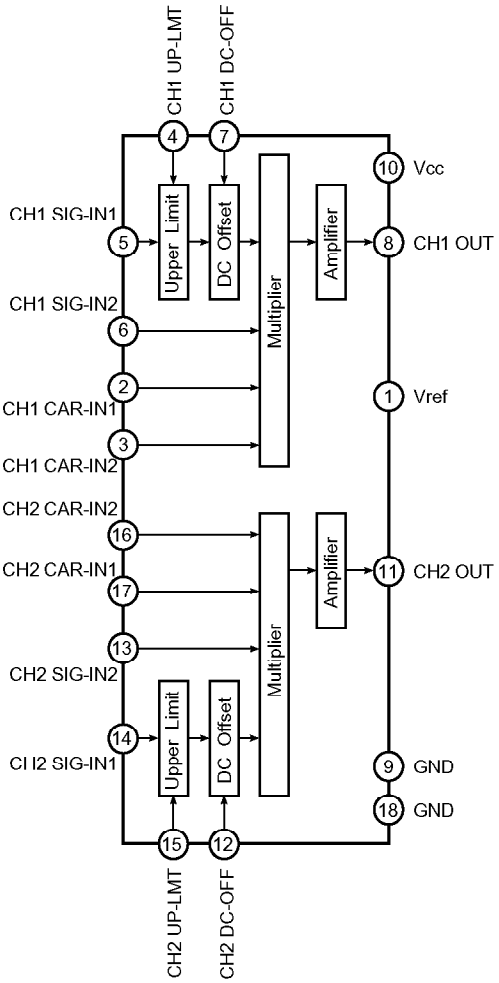
INPUTS			OUTPUTS		NOTE
A	B	RESET	Q	$\overline{Q}$	
↓	H	H	⎍	⎎	Output Pulse
↓	L	H	L	H	Inhibit
H	↓	H	L	H	Inhibit
L	↓	H	⎍	⎎	Output Pulse
*	*	L	L	H	Inhibit

* : Don't care.

1.7. IC17 on the Main Board is using the Dual Balanced Modulators IC AN2020S.
Description of this IC is as follows:

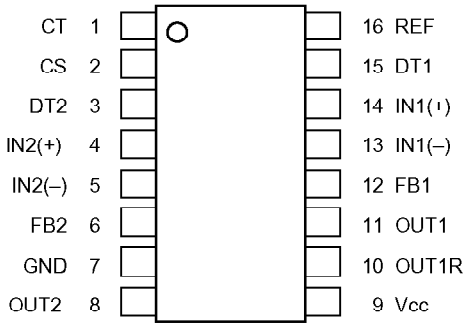


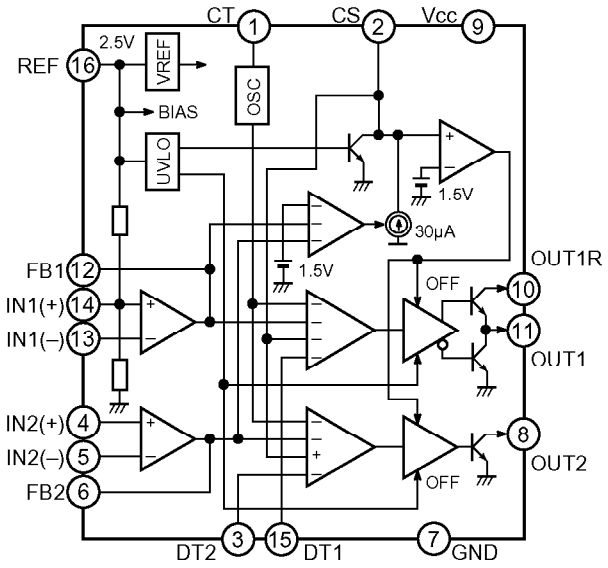
Pin	Name	I/O	Description
1	Vref	–	Reference voltage terminal (1.8V typical).
2	CH1 CAR-IN1	I	Channel 1 Carrier input terminal 1.
3	CH1 CAR-IN2	I	Channel 1 Carrier input terminal 2.
4	CH1 UP-LMT	I	Channel 1 Upper Limit control terminal.
5	CH1 SIG-IN1	I	Channel 1 Signal input terminal 1.
6	CH1 SIG-IN2	I	Channel 1 Signal input terminal 2.
7	CH1 DC-OFF	I	Channel 1 DC Offset control terminal.
8	CH1 OUT	O	Channel 1 output terminal.
9	GND	–	Ground terminal.
10	Vcc	–	Power (4.8V) supply terminal.
11	CH2 OUT	O	Channel 2 output terminal.
12	CH2 DC-OFF	I	Channel 2 DC Offset control terminal.
13	CH2 SIG-IN2	I	Channel 2 Signal input terminal 2.
14	CH2 SIG-IN1	I	Channel 2 Signal input terminal 1.
15	CH2 UP-LMT	I	Channel 2 Upper Limit control terminal.
16	CH2 CAR-IN2	I	Channel 2 Carrier input terminal 2.
17	CH2 CAR-IN1	I	Channel 2 Carrier input terminal 1.
18	GND	–	Ground terminal.



2. Power Board (WV-BP312)

2.1. IC1 on the Rear Board of the WV-BP312 is using the Switching Regulator Control IC YWFA7611M.
Description of this IC is as follows:





Pin	Name	I/O	Description
1	CT	–	Oscillator timing capacitor terminal.
2	CS	–	Soft start and Short-protection delay capacitor terminal.
3	DT2	I	Dead Time 2 control terminal.
4	IN2(+)	I	Error Amp. 2 non-inverting input terminal.
5	IN2(–)	I	Error Amp. 2 inverting input terminal.
6	FB2	–	Error Amp. 2 Feedback terminal.
7	GND	–	Ground terminal.
8	OUT2	O	Channel 2 output terminal.
9	Vcc	–	Power supply terminal.
10	OUT1R	O	Current Limit resistor terminal.
11	OUT1	O	Channel 1 output terminal.
12	FB1	–	Error Amp. 1 Feedback terminal.
13	IN1(–)	I	Error Amp. 1 inverting input terminal.
14	IN1(+)	I	Error Amp. 1 non-inverting input terminal.
15	DT1	I	Dead Time 1 control terminal.
16	VREF	O	Reference voltage output terminal. (2.5V)

ADJUSTMENT PROCEDURE

1. Test Equipment Required

- The following test equipments are required for adjustment of the CCTV Cameras WV-BP310, WV-BP312 and WV-BP314.

- Oscilloscope
- Frequency Counter
- Digital Voltmeter
- Waveform Monitor
- Underscanned Black and White Video Monitor
- Signal Generator (Black Burst or Composite Video Signal)
- 12V DC Power Supply Unit
- Lighting (1,050 nt (2,750 lux))
- 40-watt Lamp
- Lux Meter
- ALC Lens
- Manual Iris Lens
- ND4 Filter
- ND8 Filter
- Radiation Chart
- Logarithmic Gray Scale Chart (Part No.: YWV2310RB99 AN) as shown in Fig. 1-1.

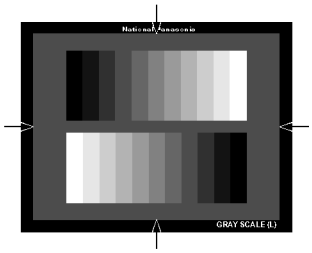


Fig. 1-1

- Extension Board Ass'y (Part No. : YWV0EA327AN) as shown in Fig. 1-2-1 (Mounting Bracket) and Fig. 1-2-2 (Extension Board).

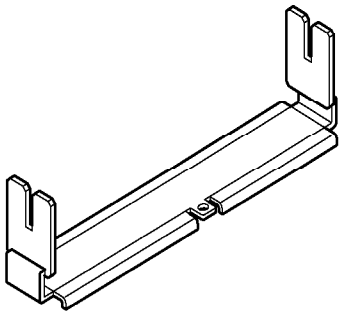


Fig. 1-2-1

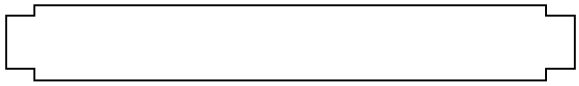


Fig. 1-2

2. Disassembling Procedure for Adjustment

- Referring to Fig. 2-1, remove two screws fixing the Mounting Bracket and remove the Mounting Bracket.

Fig. 2-1

- Referring to Fig. 2-2, remove two screws fixing the Bottom Cover and remove the Bottom Cover.

Fig. 2-2

- Referring to Fig. 2-3, disconnect two connectors CN1 and CN2 then remove two screws fixing the Main Board and remove the Main Board.

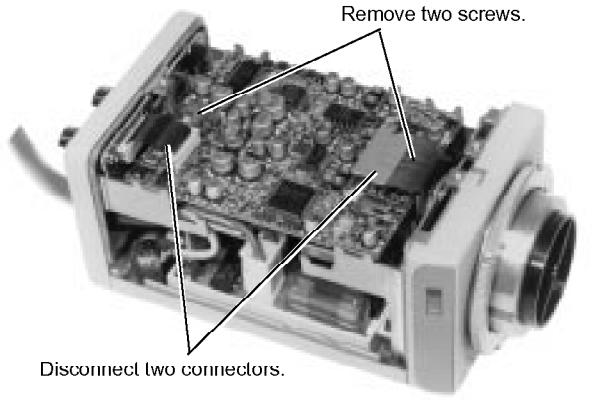


Fig. 2-3

- Referring to Fig. 2-4, mount the Mounting Bracket by removed screw.

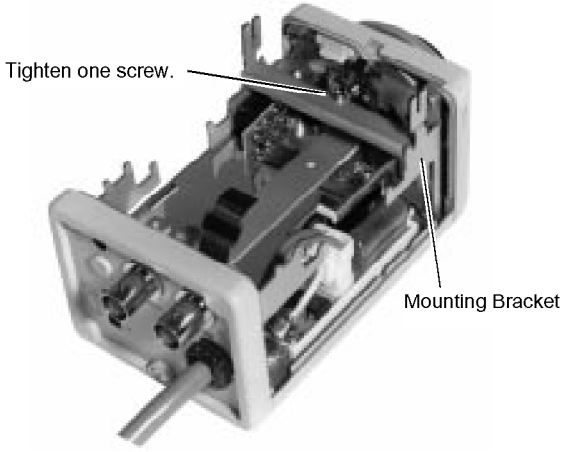


Fig. 2-4

- Referring to Fig. 2-5, connect between CN1 on the Rear Board and CN2 of Main Board by the Extension Board.

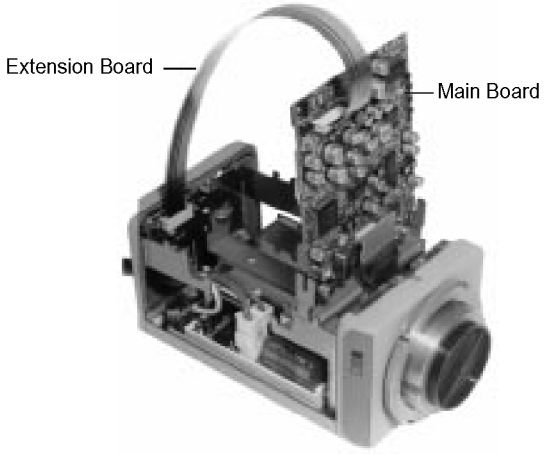


Fig. 2-5

3. Head Optical Ass'y Replacement Procedure

- Disassemble the Camera while referring to the Item **2. Disassembling Procedure for Adjustment**.
- Referring to Fig. 3-1, remove one screw fixing the Front Chassis and remove the Front Chassis.

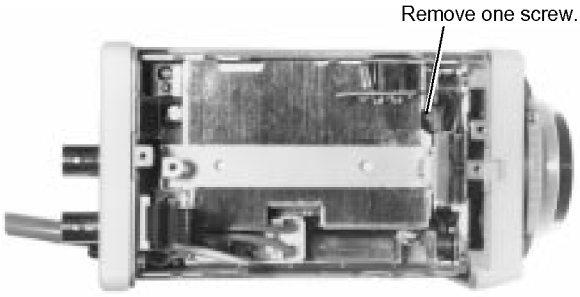


Fig. 3-1

- Referring to Fig. 3-2, remove one screw fixing the ALC Board, and disconnect CN1 from the Sensor Board.
- Remove CN2 ALC Connector from the Front Chassis and remove the ALC Board.

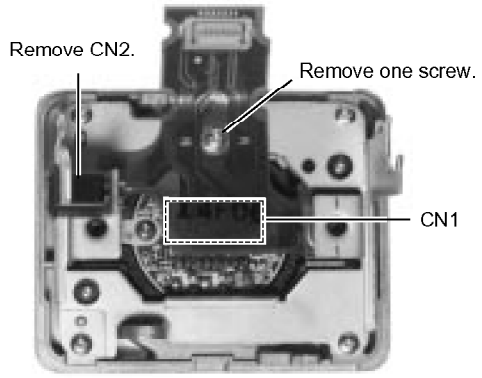


Fig. 3-2

- Referring to Fig. 3-3, remove four screws fixing the Front Chassis and remove the Head Optical Ass'y.

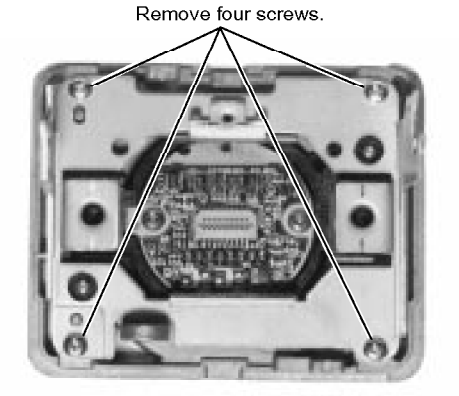


Fig. 3-3

4. Connection and Setting Up for Adjustment

4.1. Connection

- The Fig. 4-1 shows the Connecting Diagram for the Adjustment procedure.

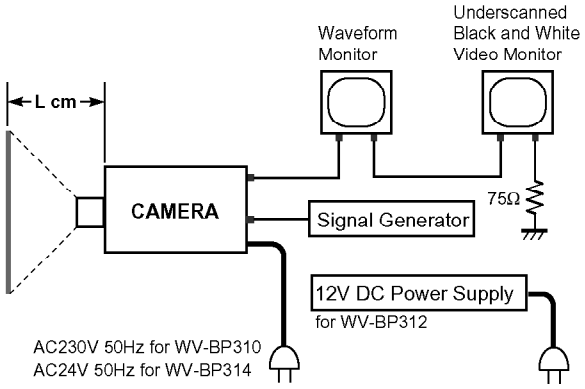


Fig. 4-1

- Connect the Underscanned Black and White Video Monitor through the Waveform Monitor to the Video Output Connector on the Rear Panel of the WV-BP310, WV-BP312 or WV-BP314.
- Terminate the input terminal of the Underscanned Black and White Video Monitor with 75Ω.
- **For the WV-BP314**, connect the AC 24V Power Supply Unit to the AC 24V IN Terminal on the Rear Panel of the WV-BP314.
- **For the WV-BP312**, connect the DC Power Supply Unit to the DC 12V IN Terminal on the Rear Panel of the WV-BP312.
- Connect the probe of the Digital Voltmeter, Oscilloscope or Frequency Counter to the desired Test Point in each adjustment step.

4.2. Initial Position of the Switches and Controls for Adjustment

- An initial setting of the Switches and Controls on the Rear Panel of the WV-BP310, WV-BP312 or WV-BP314 as follows:

AGC ON/OFF Switch	ON
INT/LL Switch	INT
ELC/ALC Switch	ALC
VIDEO/DC Switch	DC
Hi-Z/GL 75Ω	75Ω
V. Phase Control	Not specified
ALC Level Control	Mechanical Center

- The adjustment should be done with this initial setting, unless otherwise specified.
- The adjustment should be done after 10 minutes warmup.

4.3. Setting Up for Standard Picture

- Mount the Manual Iris Lens on the Camera.
- Set the Logarithmic Gray Scale Chart.
- Incident light of 1,050 ± 50 nt (2,750 ± 150 lux) on the Logarithmic Gray Scale Chart.
- Aim the Camera at the Logarithmic Gray Scale Chart.
- Mount the ND8 Filter on the Lens.
- Set the Camera so that the Camera at the Logarithmic Gray Scale Chart becomes full picture on the Underscanned Black and White Video Monitor.
- Connect the Oscilloscope to TP4 (CCD OUT) on the Main Board.
- Trigger the Oscilloscope at TP5 (WHD) on the Main Board.
- Set the Lens Iris so that the Video signal level becomes 200 ± 10 mVp-p as shown in Fig. 4-2.

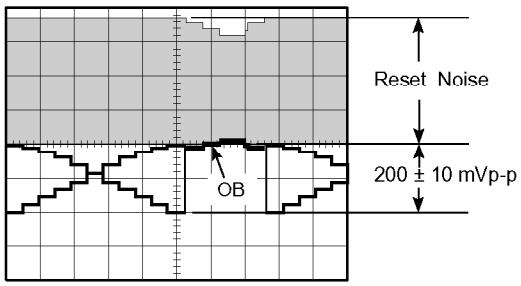


Fig. 4-2

- The adjustment should be done with this Standard Picture, unless otherwise specified.

5. Adjustment Procedure

- Refer to the Location of the Test Points and Adjusting Controls on page 18.

(1) + 9.0V Confirmation

Test Point: Pin 12 of CN2 (+9V) Main Board

- Connect the Digital Voltmeter to the pin 12 of CN2.
- Confirm that the voltage at the pin 12 of CN2 should be within 9.0 ± 0.5V.

(2) + 5.0V Confirmation

Test Point: Pin 1 of IC11 (+5V(TG)) Main Board
Pin 1 of IC14 (+5V(ALC)) Main Board
Pin 1 of IC16 (+5V(Process)) Main Board

- Connect the Digital Voltmeter to the pin 1 of IC11.
- Confirm that the voltage at the pin 1 of IC11 should be within 5.0 ± 0.5V.
- Change the connection of the Digital Voltmeter to the pin 1 of IC14.
- Confirm that the voltage at the pin 1 of IC14 should be within 5.0 ± 0.5V.
- Change the connection of the Digital Voltmeter to the pin 1 of IC16.
- Confirm that the voltage at the pin 1 of IC16 should be within 5.0 ± 0.5V.

(3) + 16.3V Confirmation

Test Point: TP8 (+16.3V) Main Board

- Connect the Digital Voltmeter to TP8.
- Confirm that the voltage at TP8 should be within 16.3 ± 0.5V.

(4) – 8.2V Confirmation

Test Point: TP9 (–8.2V) Main Board

- Connect the Digital Voltmeter to TP9.
- Confirm that the voltage at TP9 should be within – 8.2 ± 0.5V.

(5) +1.8V Confirmation

Test Point: TP6 (+1.8V) Main Board

- Connect the Digital Voltmeter to TP6.
- Confirm that the voltage at TP6 should be within +1.8 ± 0.2V.

(6) LL Sync Adjustment

Test Point: Video Output Connector Rear Panel
Adjust: V. PHASE Control Rear Panel

- Set the INT/LL Switch on the Rear Panel to the LL position.
- Connect the CH1 of the Oscilloscope to the Live side of the AC Power Cord.
- Connect the CH2 of the Oscilloscope to the Video Output Connector.
- Confirm that the Vertical Sync Phase should be changed –320° to +8° by adjusting V. PHASE Control.
- Adjust V. PHASE Control so that the Phase difference between Live Line and Vertical Sync signal becomes 2H ± 1H as shown in Fig. 5-1.

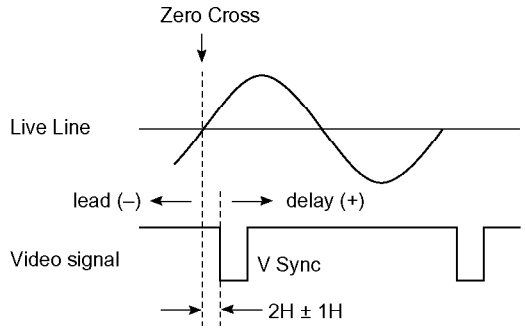


Fig. 5-1

- After completion of adjustment, set the INT/LL Switch on the Rear Panel to the INT position.

(7) LL VCO Adjustment

Test Point: TP1 (LL VCO) Main Board
Adjust: L1 (LL VCO) Main Board

- Set the INT/LL Switch on the Rear Panel to the LL position.
- Connect the Digital Voltmeter to TP1.
- Adjust L1 to obtain 2.5 $^{+0.2}_{-0.1}$ V DC.
- After completion of adjustment, set the INT/LL Switch on the Rear Panel to the INT position.

(8) Reset Bias Adjustment

Test Point: TP4 (CCD OUT) Main Board
Adjust: VR1 (RESET BIAS) Main Board

- Aim the Camera at the Logarithmic Gray Scale Chart.
- Connect the Oscilloscope to TP4.
- Trigger the Oscilloscope at TP5.
- Set the Lens Iris so that the Video signal level becomes 200 ± 10 mVp-p as shown in Fig. 5-2.

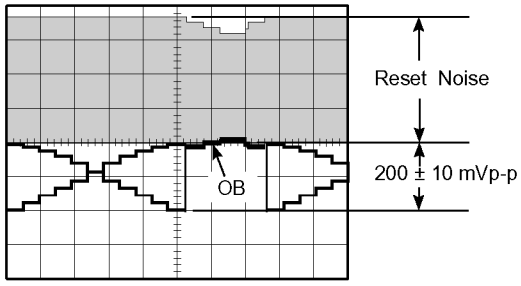


Fig. 5-2

- Adjust VR1 so that the Reset Noise becomes maximum as shown in Fig. 5-3.

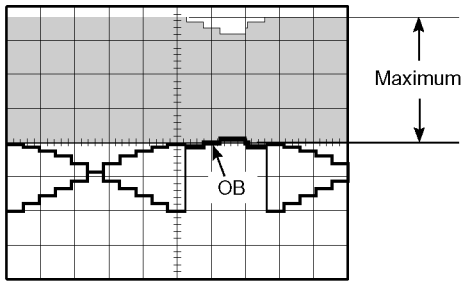


Fig. 5-3

(9) VSUB Coarse Adjustment

Test Point: **TP4 (CCD OUT)** **Main Board**

Adjust: **VR2 (VSUB)** **Main Board**

- Aim the Camera at the Logarithmic Gray Scale Chart.
- Connect the Oscilloscope to TP4.
- Trigger the Oscilloscope at TP5.
- Set the Lens Iris so that the Video signal becomes 750 ± 20 mVp-p as shown in Fig. 5-4.
  If can not reach the specified level, adjust VR2 so that the saturation level becomes higher and then set the Lens Iris to obtain specified level.

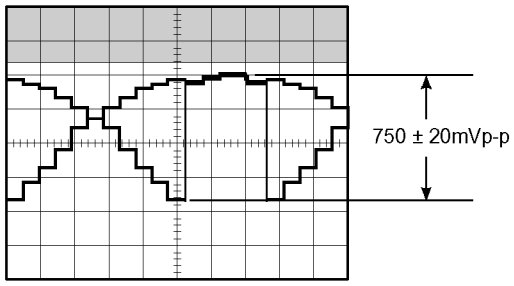


Fig. 5-4

- Adjust VR2 so that the saturation level of the CCD OUT signal level becomes more than 750 ± 20 mVp-p as shown in Fig. 5-5.

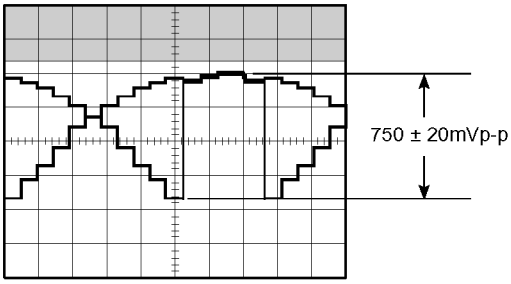


Fig. 5-5

(10) ELC Level Adjustment

Test Point: **TP7 (ELC DRCT)** **Main Board**

Adjust: **VR5 (ELC LEVEL)** **Main Board**

- Set the ELC/ALC Switch on the Rear Panel to the ALC position.
- Aim the Camera at the Logarithmic Gray Scale Chart.
- Connect the Oscilloscope to TP7.
- Trigger the Oscilloscope at TP5 by H-rate.
- Adjust VR5 so that the signal level at TP7 changes between Ground level and 5V DC alternately as shown in Fig. 5-6.

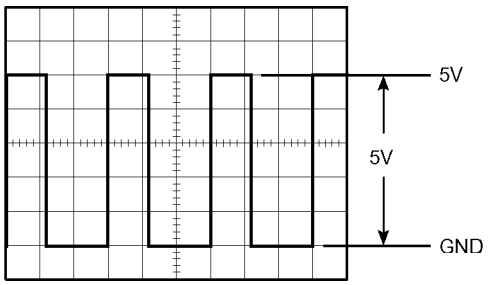


Fig. 5-6

(11) Pedestal and AGC ON Adjustment

Test Point:	**Video Output Connector**	**Rear Panel**
Adjust:	**VR6 (PEDESTAL)**	**Main Board**
	VR4 (AGC ON)	**Main Board**

- Aim the Camera at the Logarithmic Gray Scale Chart.
- Connect the terminated Oscilloscope with 75Ω to the Video Output Connector.
- Trigger the Oscilloscope at TP5 by H-rate.
- Cap on the Lens.
- Adjust VR6 so that the Pedestal level becomes 50 ± 10 mVp-p as shown in Fig. 5-7.

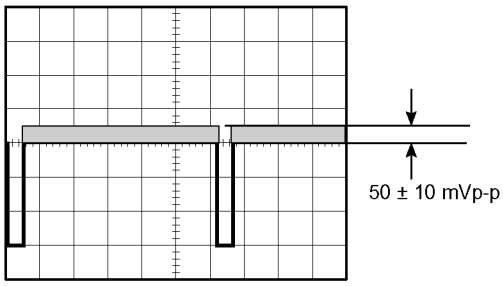


Fig. 5-7

- Remove the cap from the Lens.
- Adjust VR4 so that the Video signal level becomes 700 ± 30 mVp-p as shown in Fig. 5-8.

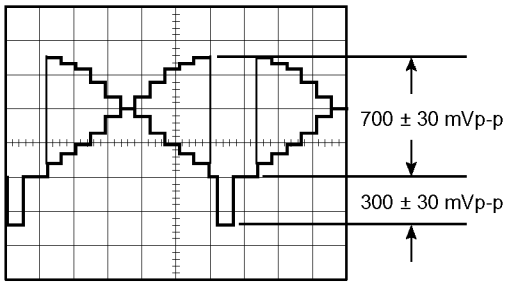


Fig. 5-8

- Repeat adjust from the Pedestal level and Video signal level until satisfactory.
- Confirm that the Sync Level should be within 300 ± 30 mVp-p as shown in Fig. 5-8.

(12) AGC OFF Adjustment

Test Point:	**Video Output Connector**	**Rear Panel**
Adjust:	**VR7 (AGC OFF)**	**Main Board**

- Set the AGC ON/OFF Switch on the Rear Panel to the OFF position.
- Aim the Camera at the Logarithmic Gray Scale Chart.
- Connect the terminated Oscilloscope with 75Ω to the Video Output Connector.
- Trigger the Oscilloscope at TP5 by H-rate.
- Adjust VR7 so that the Pedestal level becomes 700 ± 30 mVp-p as shown in Fig. 5-9.

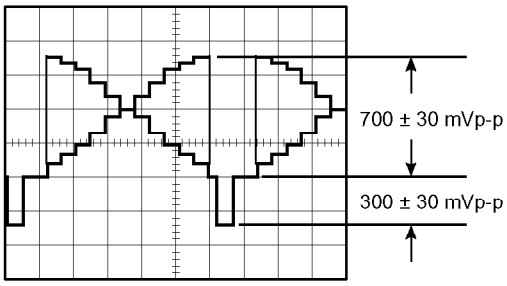


Fig. 5-9

- Cap on the Lens.
- Confirm that the Pedestal level should be within 50 ± 30 mVp-p.
- After completion of adjustment, set the AGC ON/OFF Switch on the Rear Panel to the ON position.

(13) ALC Level Adjustment

Test Point:	**TP7 (ELC DRCT)**	**Main Board**
	TP4 (CCD OUT)	**Main Board**
	Video Output Connector	**Rear Panel**
Adjust:	**VR3 (ALC LEVEL)**	**Main Board**
	ALC Level Control	**Rear Panel**

- Set the AGC ON/OFF Switch on the Rear Panel to the OFF position.
- Set the ALC Level Control on the Rear Panel to its mechanical center.
- Aim the Camera at the Logarithmic Gray Scale Chart.
- Connect the Oscilloscope to TP7.
- Trigger the Oscilloscope at TP5 by H-rate.
- Adjust VR3 so that the signal level at TP7 changes between Ground level and 5V DC alternately as shown in Fig. 5-10.

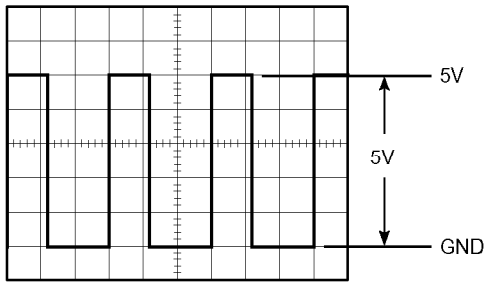


Fig. 5-10

- Change the connection of the Oscilloscope to TP4.
- Confirm that the CCD OUT signal level should be within 200 ± 30 mVp-p as shown in Fig. 5-11.

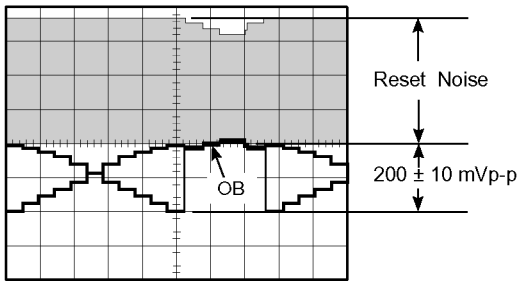


Fig. 5-11

- Connect the terminated Oscilloscope to the Video Output Connector.
- Confirm that the Video signal level should be within 700 ± 30 mVp-p.
- Confirm that the Video signal level should be changed by adjusting of the ALC Level Control on the Rear Panel.
- Reset the ALC Level Control so that the Video signal level becomes 700 ± 30 mVp-p as shown in Fig. 5-12.

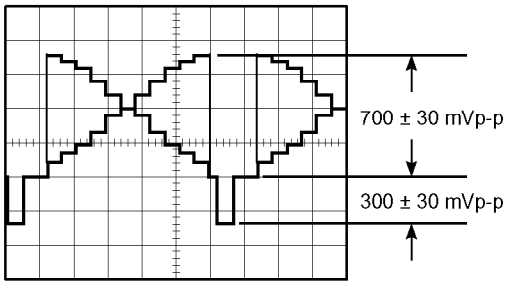


Fig. 5-12

- After completion of adjustment, set the AGC ON/OFF Switch on the Rear Panel to the ON position.

(14) Flangeback Adjustment

Test Point: Video Output Connector Rear Panel
Adjust: Flangeback Adjusting Ring

- Set the Radiation Chart.
- Aim the Camera at the Radiation Chart distance of 10m.
- Referring to Fig. 5-13, loosen two screws fixing the Flangeback Adjusting Ring.

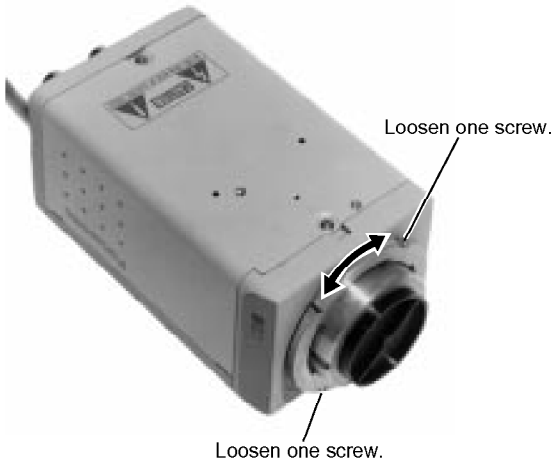


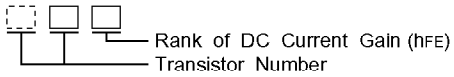
Fig. 5-13

- Mount two ND8 Filters and one ND4 Filter on the Lens.
- Adjust the Flangeback Adjusting Ring to obtain best focal point.
- Tighten two screws fixing the Flangeback Adjusting Ring carefully.

CHIP COMPONENTS

1. Chip Transistor

The transistor number is indicated on the top surface of the chip transistor using two alphabet letters or one numerical number and two alphabet letters.



Transistor Number

(Chip Transistor)

Letter	Transistor No.	Letter	Transistor No.
A	2SB709	X	2SD602A
B	2SB709A	Y	2SD601
C	2SB710	Z	2SD601A
D	2SB710A	1A	2SB799
E	2SA1022	1B	2SB814
F	2SA1034	1C	2SB902
H	2SA1035	1F	2SK321
I	2SB792	1K	2SK316
K	2SC2778	1L	2SK247
P	2SD814	1M	2SJ84
Q	2SD813	1N	2SK199
R	2SC2480	1O	2SK198
S	2SC2405	1T	2SC3077
T	2SC2406	1X	2SC2845
U	2SC2404	1Z	2SD1030
V	2SC2295	2B	2SK374
W	2SD602	2C	2SK116
BQ	2SB766A	UMT	2SC4081

(Small Chip Transistor) (Pair Transistor)

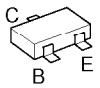
Letter	Transistor No.
A	2SB1218
B	2SB1218A
D	2SB1219A
U	2SC3931
W	2SD1820
X	2SD1820A
Y	2SD1819
E3	2SA1226
OS	2SB1219
UC	2SA1532
YU	2SC3938

Letter	Transistor No.	Letter	Transistor No.
5R	XN1501	5H	XP4501
7S	XN1601	5C	XP4601
5H	XN4501	5H	XP4501
5C	XN4601	5L	XP5501
5L	XN5501	4N	XP5601
4N	XN5601	7S	XP6501
5N	XN6501	7W	XP6435
7W	XN6435	7F	XP6534
7F	XN6534	X1	UMX1
5R	XP1501	Z1	UMZ1
7S	XP1601		

Example: WQ → 2SD602-Q
YQ → 2SD601-Q
1BS → 2SB814-S

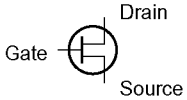
Appearance and Symbols

Transistor



C: Collector
B: Base
E: Emitter

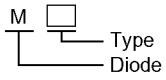
FET



	1	2	3
Eacept 2SK199	Drain	Source	Cate
2SK199	Gate	Drain	Source

2. Chip Diode

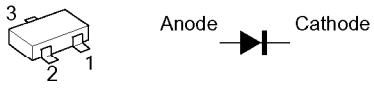
The diode number is indicated on the top surface of the chip diode using two alphabet letters.



Diode Number

Letter	Diode No.	Letter	Diode No.
MA	MA151A	MI	MA152K
MB	MA152A	MK	MA28W-B
MC	MA153	ML	MA28T-A
MD	MA28-A	MN	MA151WA
ME	MA28-B	MO	MA152WA
MF	MA20W-A	MT	MA151WK
MH	MA151K	MU	MA152WK
MH	MA141K	6.2	MA3062
MC	MA143	SMD	RD421D

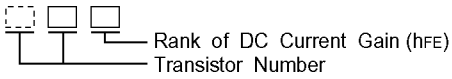
Appearance and Symbols



	1	2	3
MA28/MA28W/MA28T	–	Anode	Cathode
MA151K/MA152K	–	Anode	Cathode
MA151A/MA152A	–	Cathode	Anode
MA151WK/MA152WK	Anode	Anode	Cathode
MA151WA/MA152WA	Cathode	Cathode	Anode
MA153	Cathode	Anode	Common
MA141K	–	Anode	Cathode
MA143	Anode	Cathode	Common
MA3062	Anode	–	Cathode
RD421D	Anode	–	Cathode

3. Chip Resistor

The resistor value is indicated on the bottom surface of the chip resistor using three digit numbers.



Example:

330 → $33 \times 10^0 = 33\ \Omega$
561 → $56 \times 10^1 = 560\ \Omega$
123 → $12 \times 10^3 = 12\ k\Omega$

Note: Zero ohm resistor (jumper chip) is colored red or green.

4. Chip Capacitor

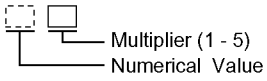
The capacitive value of replacement chip capacitors is indicated on the bottom surface. Original parts have no value indication.

If the capacitive value is less than 100 pF, the value will be indicated by one or two digit number expressing the capacity directly in pF.

Example:

0.5 → 0.5 pF 2.5 → 2.5 pF
.75 → 0.75 pF 33 → 33 pF
1 → 1 pF 82 → 82 pF

If the capacitive value is 100 pF or greater, the value will be indicated by an alpha-numeric code. The letter precedes the number and expresses a numerical value to be multiplied by the number which follows.



Numerical Value

Letter	Value	Letter	Value
A	10	N	33
B	11	P	36
C	12	Q	39
D	13	R	43
E	15	S	47
F	16	T	51
G	18	U	56
H	20	V	62
J	22	W	68
K	24	X	75
L	27	Y	82
M	30	Z	91

* Letters I and O are not used.

Example: A1 → 10×10^1 = 100 pF

N2 → 33×10^2 = 3300 pF

S3 → 47×10^3 = 47000 pF

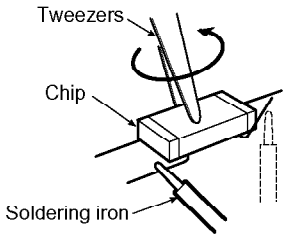
5. Precautions in replacing the chip component

1. Make sure that the unit is turned OFF when replacing the chip.
2. Use tweezers to prevent any damage to the chip surface.
3. Do not re-use the chips after removal.
4. Do not rub the electrode of chips.
5. Do not subject the chips to excessive stress.
6. It is recommended that a pencil-type soldering iron to be used.
7. The solder whose diameter is less than 0.5 mm is recommended.
8. Do not heat the chip more than 3 seconds.
9. Maintain temperature control under 260°C (500°F) when soldering.

5-1. Removal (Transistor, Diode, Resistor and Capacitor)

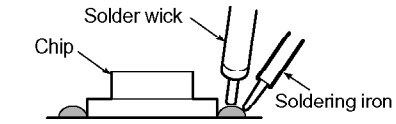
1. Add the solder to both ends of the chip (three leads for chip transistor).
2. While attaching the soldering iron to both ends of the chip (three leads for chip transistor) as shown below, remove the chip by turning with tweezers.

Note: Be careful not to damage other chips.

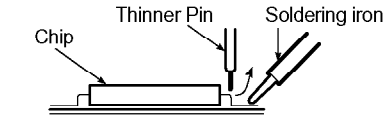


5-2. Removal (IC)

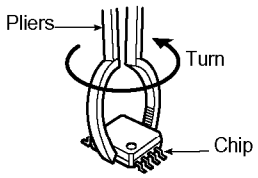
1. Add the solder wick and soldering iron to each lead of the IC and remove solder.



2. Add the soldering iron to each lead of the IC and left each lead of the IC using thinner pin.

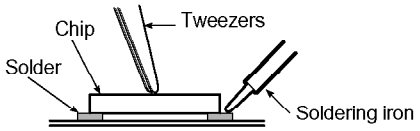


3. Remove the IC turning with pliers.

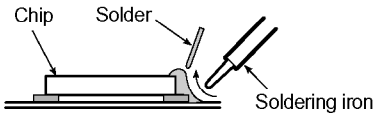


5-3. Mounting

1. Place the solder thinly on the chip mounting foil.
2. Solder the chip temporarily while holding the chip with the tweezers.

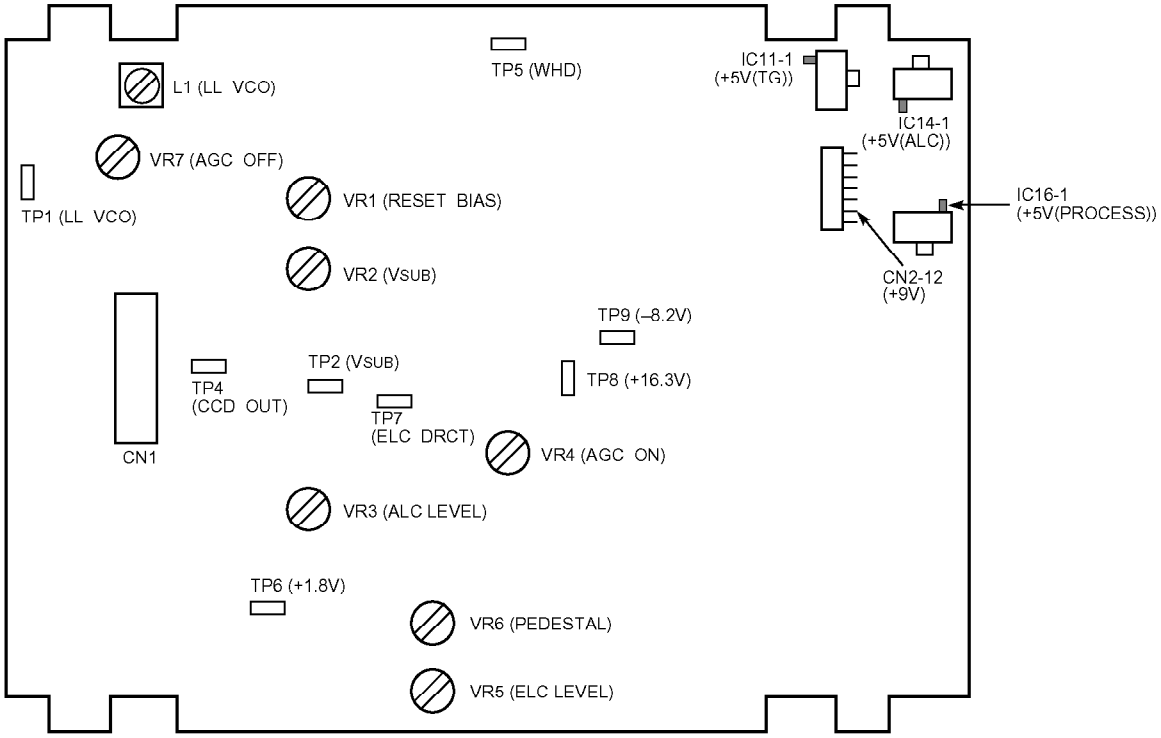


3. Solder both ends of the chip (three leads for chip transistor).



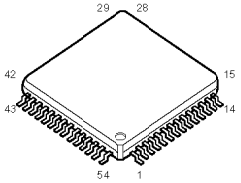
LOCATION OF TEST POINTS AND ADJUSTING CONTROLS

MAIN BOARD (COMPONENT SIDE)



APPEARANCE OF IC, TRANSISTOR AND DIODE

YWBU6121KS



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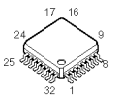
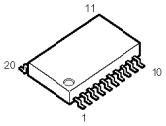
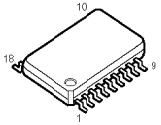


MN3112SA



AN2020S



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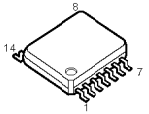

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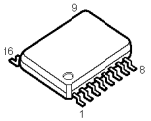
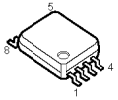
YWMC14053BF
YWMC14538BF
YWFA7311M



NJM3414M
NJM2901M
YW5304S



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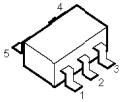

YWPS2501-1KA

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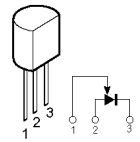

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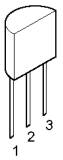
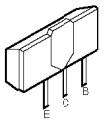
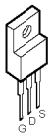


1: INPUT
2: GND
3: OUTPUT

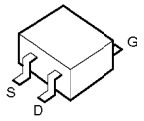
2SB766A-RS



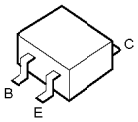
2SK2132
2SK182101M



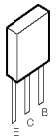
2SK662-PQR



2SA1576-QRS
2SB1218-QRS
2SC2412-QRS
2SC4081-QRS
2SC4627
2SD1819-QRS



2SA886-QR



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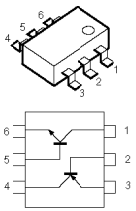
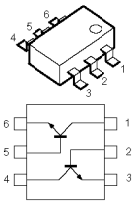
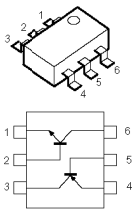


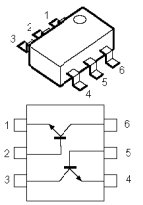
XN4501



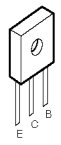
UMZ1



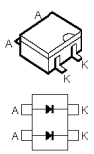
UMX1



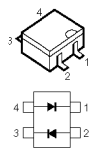
2SC1568-ST



MA159



MA714



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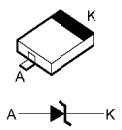
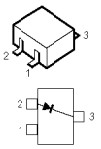
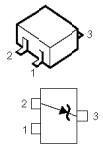


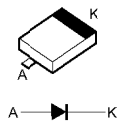
MA141K
YWDAN217



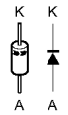
MA3062
MA3039



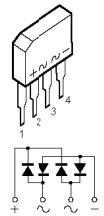
MA729



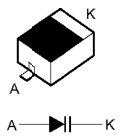
YWERA31004



S1VB30
YWD2SBA20



MA372



MA736
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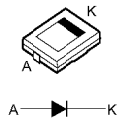
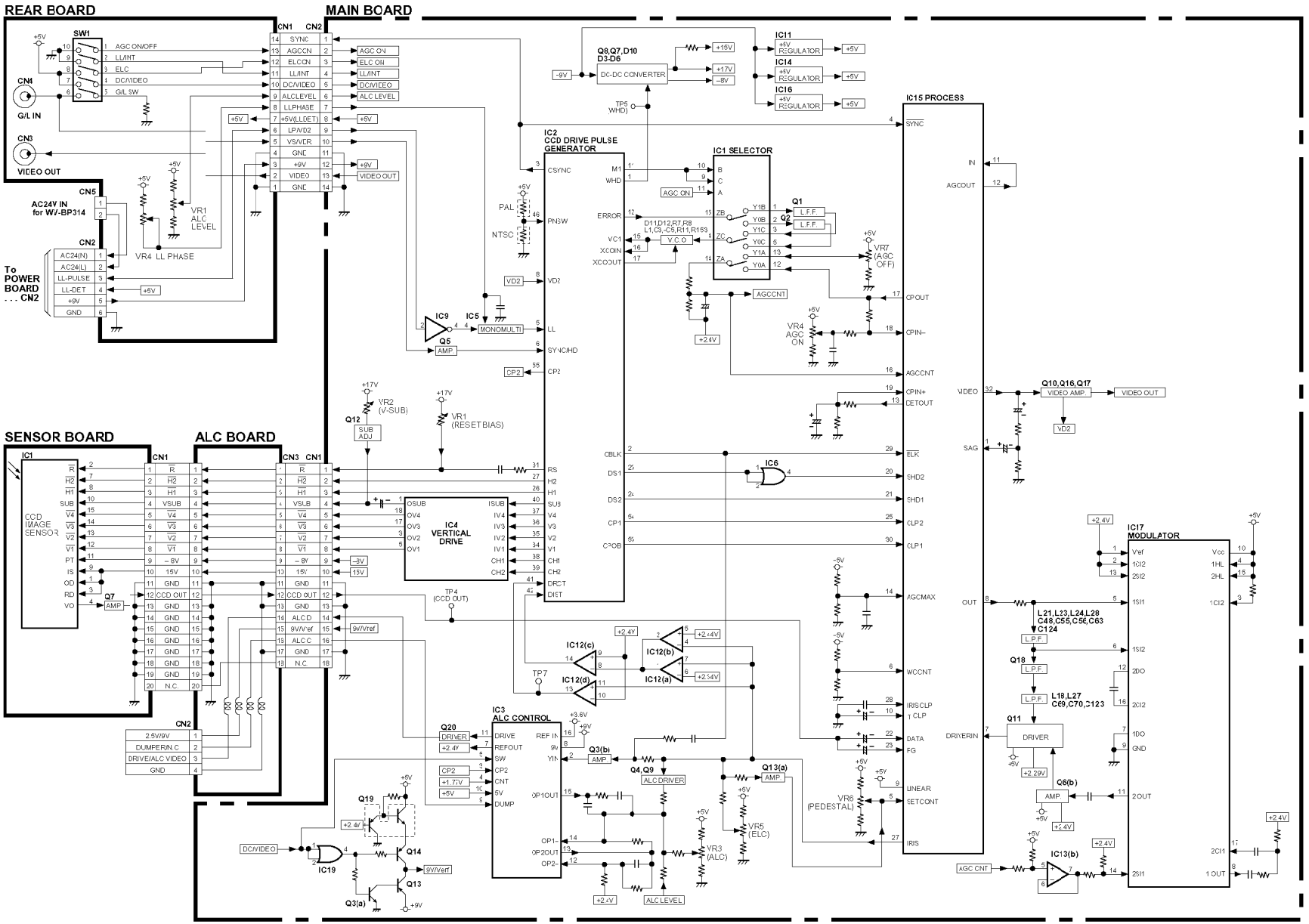
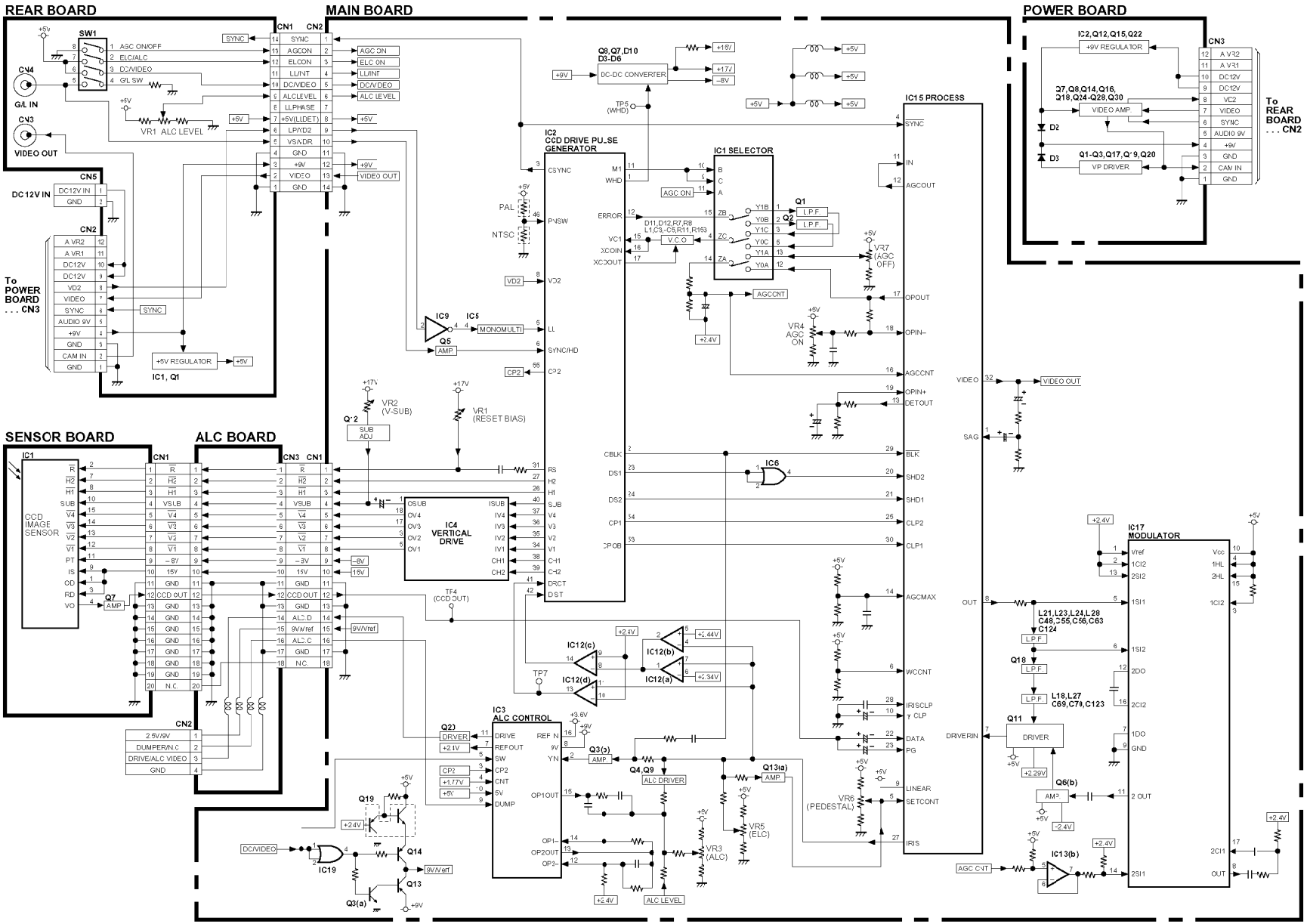
YWSC80236L
YWSC80239R



BLOCK DIAGRAM (WV-BP310/WV-BP314)



BLOCK DIAGRAM (WV-BP312)



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